DEVELOPMENT OF A UL STANDARD FOR THE INTERCONNECTION OF DISTRIBUTED GENERATION

SUBCONTRACT NO. 30605 - 2

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PRESENTED AT U.S. DEPARTMENT OF ENERGY
DISTRIBUTED POWER PROGRAM
ANNUAL REVIEW MEETING
JANUARY 29-30, 2002
ARLINGTON, VA

Project Goal

- Use the Standards Technical Panel (STP) process with the assistance of DG industry experts to combine the appropriate safety requirements with the necessary utility interconnection requirements from IEEE 1547 into one document.

Ultimate Goal

- This combination of requirements will yield a DG ANSI Standard that can be used to evaluate utility interconnected DG products for both electrical safety and utility interconnection to address the needs of Electrical AHJs and Utility Interconnection Engineers.

- This document will be UL 1741, The Standard for Inverters, Converters and Controllers for Use In Independent Power Systems

Benefit to Distributed Power Program

- This will facilitate the Distributed Power Program's goal of developing a streamlined system under which utility interconnected DG products may be designed, produced, evaluated, certified, sold, installed and operated in a smooth and agreeable manner for all parties involved.

D-1.2 (Task 1) Situation Analysis:

A report summarizing the current situation of the UL Standard development for utility interconnected DG products.

- Selection of test equipment
- Validation of test facilities
- Issues associated with the testing interconnection equipment.

The scope of UL 1741 was expanded to include inverters, converters and controllers for all types of DG sources.

D-1.3 (Task 2) Literature Search:

- Report, summarizing a literature search of pertinent technical documents relevant to interconnection of DG to utility distribution systems.

- Focused on technical articles detailing safety issues that influence product design and testing. Emphasis was placed on documents within the past ten years.

D-1.4 (Task 3) - NEC Review Report:

- National Electrical Code, NEC issues concerning Distributed Power system components.

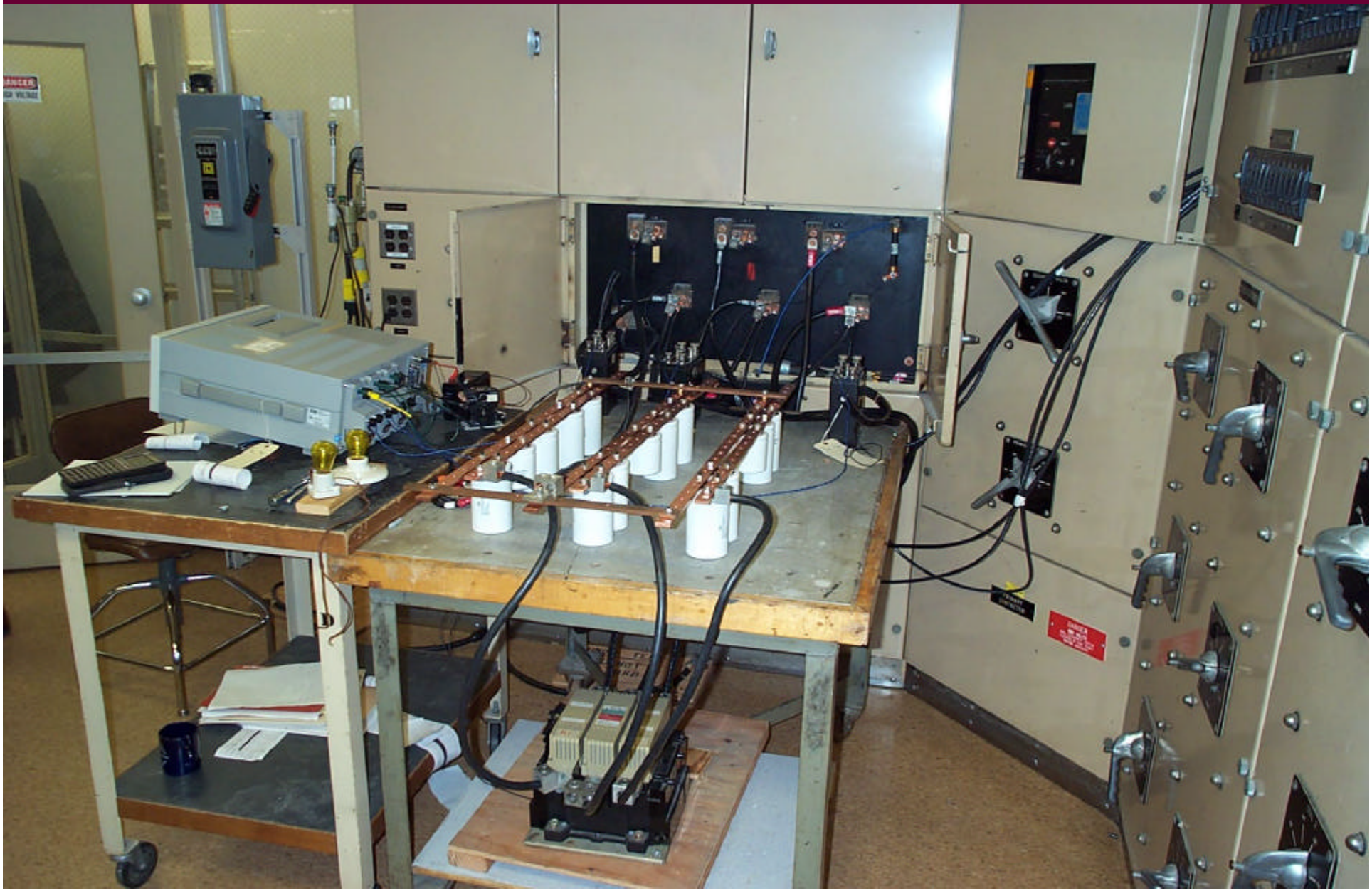
- Review of various utility interconnection guidelines to determine similarities or differences between these documents and the NEC.

Testing Research

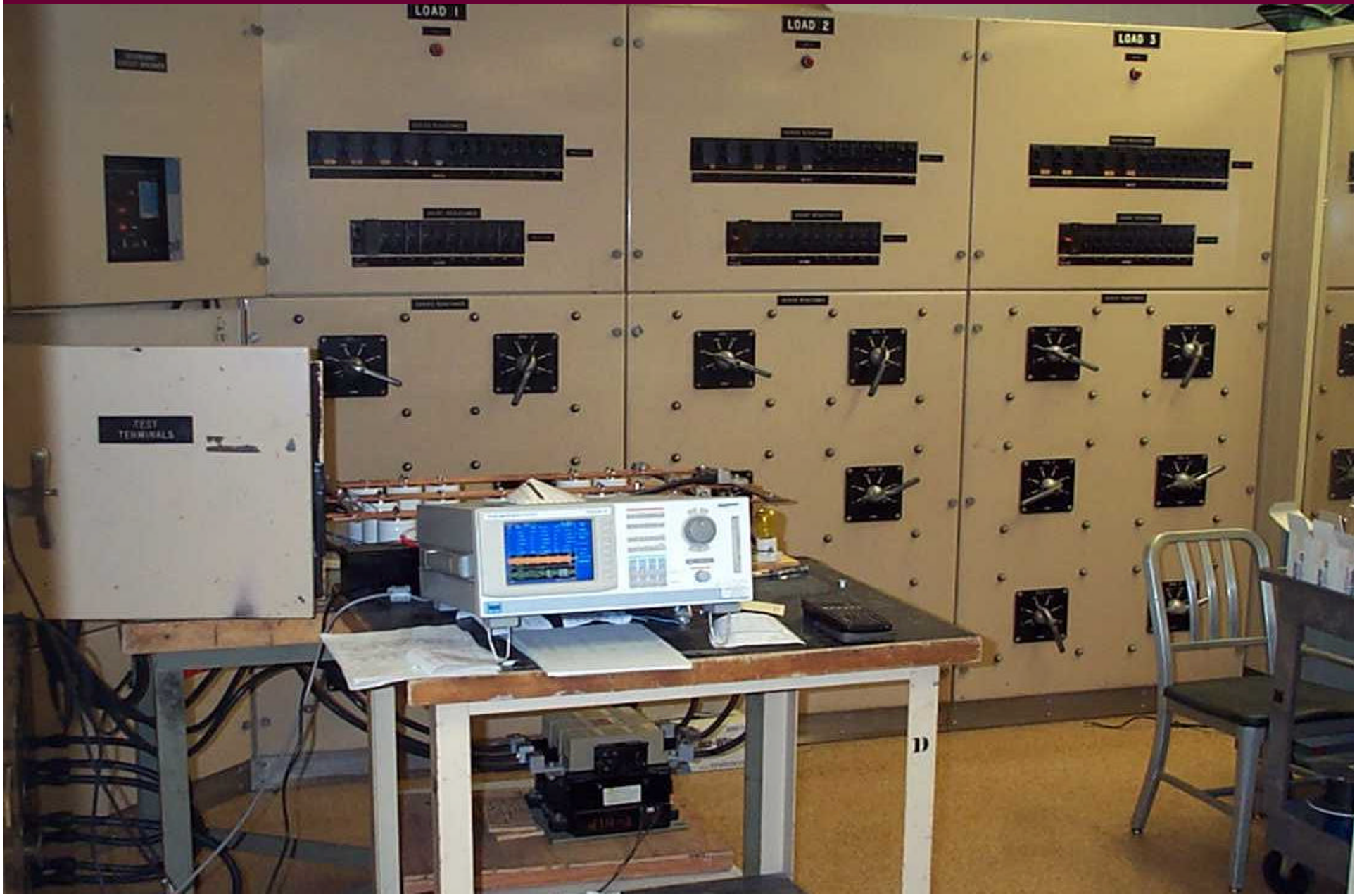
- Working with equipment Mfrs to design a large simulated utility for DG testing.
- Collaboration with Sandia Labs on the Harmonic Distortion testing and Anti-Islanding Testing
- Implementation of the Anti-Islanding Test loads for larger three phase products
- Researching DG Test equipment for data acquisition automation.
- Working with various utilities to verify test methods.

Anti-Islanding Test Load Banks

Three Phase Anti-Islanding Test



Three Phase Anti-Islanding Test



Base Year / 2001 Tasks Completed

• Situation Analysis	• April 23, 2001
• NEC and Other Interconnection Document Review and Report	• May 31, 2001
• Create STP Meeting Agenda and Assemble a Balanced UL1741 STP	• Oct 9, 2001
• Host the STP Meeting	• Nov 7-9, 2001
• Create STP Meeting Report	• Dec 11, 2001
• Annual Report Draft	• Jan 16, 2001

STP Meeting Agenda / Key Issues

- Harmonization with IEEE 1547
- Fine Tuning of Existing Requirements
- New Product Types and Features.
- New Requirements Additions

Harmonization with IEEE 1547

- Considerable work has been done to develop the Standard for Interconnecting Distributed Resources with Electric Power Systems, IEEE P1547.

- IEEE P1547 covers all forms of grid tied DG products. Once published, it should receive general acceptance as the nation interconnection document by:
  - Utilities,
  - Authorities Having Jurisdiction,
  - Manufacturers,
  - Third Party Testing Laboratories.

Fine Tuning Of Existing Requirements

- Anti-Islanding requirements and test procedures
- Utility voltage and frequency variation testing
- Harmonic distortion limits and test procedures
- Standalone product power quality
- Multi-phase product requirements and test issues
- Minimum product operating ambient
- Firmware evaluations and revision tracking
- Ground fault detector interrupters GFDIs

New Product Types and Features

- Source specific issues and parameters
- Multi-Mode products
- Transformerless products, (non-isolated)
- Protective relaying products and packages "Controllers"
- Energy storage devices and charging

New Requirement Additions

- Surge testing requirements and test procedures
- Synchronization and Flicker testing
- Minimum accuracy requirements for test equipment used to record utility interactive test data
- Isolation transformers requirements

Future Plans for Subcontract

- Option Year 1
  - Produce two (first and second) draft standards and send out for comments.
  - Incorporate STP comments into following draft standards.
  - Validation of test methodology and incorporation of findings into standards.
  - Review of testing equipment.

- Option Year 2
  - Produce Third Draft standard and send out for comments.
  - Address comments and produce the Final Standard.

Summary

- A majority of the work and deliverables performed under this contract were in preparation for the November 7-9, UL 1741 STP meeting.
- Our STP meeting was a great success and we are using the resulting information and STP comments to create the next draft of UL1741.
- We have completed all of the deliverables and are on track with the work under this project and have met the requirements under the subcontract.

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